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This project assists U.S. Army Medical Command (MEDCOM) administrators in reducing occupational injuries, lost work time, Federal Employee Compensation Act (FECA) claims, and Continuation of Pay (CoP) benefits. The first hypothesis tested if eight potential demographic, organizational, and job-site risk factors (independent variables) were predictive in five natures of injury (NOI) sustained by MEDCOM civilian employees. This dependent variable was coded as back strain, multiple strains, punctures, contusions, and diseases. This analysis sampled 1,482 employee accident/illness claims currently active in Army Safety Center files. Five multi-factor stepwise regression analyses were performed resulting in a combination of 33 factors being identified as statistically significant predictors of one or more of the NOIs. The five equations ranged from a high $R^2 = .33295$ (F [6, 1475] = 122.70395, $p < .0000$) for the analysis of diseases to a low of $R^2 = .04388$ (F [3, 1478] = 22.04332, $p < .0000$) for punctures. The second hypothesis evaluated if FECA claims paid are a function of the five NOIs. Results indicated that back strain injuries occurred with the highest frequency and costs. Results of two other studies sampling 2023 accident reports, concluded that the MEDCOM would have paid $6.2 million in CoP benefits and sustained 7.63 accidents/100 work years in FY 94.

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GRADUATE PROGRAM IN HEALTH CARE ADMINISTRATION

OCCUPATIONAL INJURIES AND ILLNESSES
PREDICTIVE RISK FACTORS AND THEIR ASSOCIATED COSTS
A STUDY OF DEPARTMENT OF ARMY CIVILIAN HEALTH CARE EMPLOYEES
ASSIGNED TO THE UNITED STATES ARMY MEDICAL COMMAND

A GRADUATE MANAGEMENT PROJECT

SUBMITTED TO LIEUTENANT COLONEL EDWARD PONATOSKI

AND LIEUTENANT COLONEL PAUL PRESS

IN CANDIDACY FOR THE DEGREE OF

MASTER OF HEALTH CARE ADMINISTRATION

BY

MAJOR DAVID J. COREY, MS, CHE

ALEXANDRIA, VIRGINIA

MAY 1995

ABSTRACT

The information in this retrospective quantitative project assists U.S. Army Medical Command (MEDCOM) administrators in reducing occupational injuries/illnesses, lost time, Federal Employee Compensation Act (FECA) claims, and Continuation of Pay (CoP) benefits. The first hypothesis tested what potential demographic, organizational, and job-site risk factors were predictive in five natures of injury to MEDCOM civilian employees. This analysis sampled 1,482 MEDCOM employee accident/illness claims currently active in Army Safety Center files. The dependent measure of nature of injury (NOI) was coded as back strain, multiple strains, puncture, contusion, and disease. Forty-nine factors were grouped into eight sets of independent variables including employee age, gender, occupation; the employing MTF's relative size; the month and day the incident occurred; and the cause and source of the injury/illness. Five multi-factor stepwise regression analyses were performed resulting in a combination of 33 factors being identified as statistically significant predictors of one or more of the NOIs The predictive power of these five equations ranged from a high $\underline{R}^2 = .33295$ ($\underline{F}$ [6, 1475] = 122.70395, $\underline{p} < .0000$) for the analysis of diseases to a low of $\underline{R}^2 = .04388$ ($\underline{F}$ [3, 1478] = 22.04332, $\underline{p} < .0000$) for punctures. The second hypothesis evaluated if FECA claims paid are a function of the five NOIs analyzed in the first hypothesis. Results indicated that back strain injuries to MEDCOM employees occurred with the highest frequency and costs in terms of lost time, FECA and CoP claims paid. An estimation study of CoP concluded that the MEDCOM would have paid $6.2 million for all lost time injuries incurred in FY 94. Another analysis sampled 2,023 accident cases for the purpose of computing accident rates/100 work years for employees assigned to similar sized MTFs and to the MEDCOM. The smallest MTFs experienced the highest annual attack rate of 8.88. The MEDCOM overall rate was 7.63.

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I want to thank my wife, my best friend, and my typist Sandra K. Corey for all of the love, understanding, and hard work that she has provided in support of my career-long goal of obtaining this degree. Her selfless assistance has made the rigors of this challenging course easier to contend with. She will always have my undying gratitude.

Thanks San!

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CHAPTER 1

INTRODUCTION

Conditions Which Prompted the Study:

In the next four years, the Department of Defense's (DoD) Military Health Services System (MHSS) will undergo tremendous change. Faced with the challenges of national health care reform and decreasing defense budgets, DoD medicine, to include the U.S. Army's new Medical Command (MEDCOM) will revamp its entire system of providing health care services. By 1997 a new managed care program called TRICARE will be implemented throughout the military Services. This managed care program's goal is to provide increased access to high quality health care to all DoD beneficiaries at reasonable costs.

To accomplish this goal, Military Treatment Facility (MTF) administrators will have to ensure that resources are made as productive as possible and operational costs are kept to a minimum. Department of Army Civilians (DACs) are an important resource to MEDCOM MTF administrators. Their high productivity will be key as the MEDCOM moves into this new and challenging managed care environment.

However, the specter of work related injuries and illness that befall civilian employees negatively impacts on employee productivity and makes the related costs of employing these individuals needlessly higher than required. Past experience shows that efforts to control accident rates can be reactive and/or intuitive and not based on firm scientific principles. However, new management philosophies such as Total Quality Management (TQM), emphasize that statistics can help health care administrators to identify, describe, predict, and control events/occurrences that seemingly happen at random. It seems practical to assume that statistical analysis can be applied by MTF administrators in their efforts to predict and control accidents and injuries sustained by their DAC employees.

A project to study this problem could increase civilian employee productivity, save MEDCOM MTFs a great deal of expense that is needlessly lost each year on the resulting injuries that occur and help move the command into this pending managed care environment. A project of this type would also be timely because of policy changes that will take place in Fiscal Year (FY) 1996.

The current need for a project to study civilian accidents and their associated costs is driven home when considering the recent issues and the historical background of civilian employee claims administration in the MEDCOM. Two major factors are evident. First, in FY 1994, the U.S.

Army Medical Command, formerly known as Health Services Command (HSC), spent over $10 million dollars in medical and compensation costs for its civilian employees who sustained occupational injuries or illnesses on the job. Second, in an effort to control these rapidly rising employee injury costs, starting in FY 96 a new policy will mandate that MTFs of the MEDCOM have direct management over their own workers' medical payments and compensation budgets to pay for Federal Employees' Compensation Act (FECA) claims.

This new program for the MEDCOM had its beginning when the Department of Defense (DoD) mandated that the Services, to include the Army Budget Office, allocate budgets and be responsible to pay for its own FECA workers' compensation claims (Whartley 1994). Currently, the Army Budget Office allocates these funds to each Major Army Command (MACOM). In compliance with DoD and Army directives, the Army Surgeon General's Office pays all of the Army Medical Department's (AMEDD) claims, to include HSC's in one annual lump sum (Whartley 1994).

However, this centralized payment method has not provided any incentives to individual Army MTFs to control civilian work related injuries because there is no financial impact on their operating budgets. Business has continued as usual with the Army Surgeon General's office picking up the tab. Workers' compensation claims costs have continued to climb. In 1989 the Army Surgeon General's Office paid

$5.9 million dollars in FECA medical and compensation claims for HSC and as mentioned before, reaching $10 million dollars in payments by FY 94. This constitutes a $4.1 million dollar or a 69.5 percent increase in claims expenses in the past five years.

In an effort to control these rapidly rising costs, the MEDCOM's Office of Accident Prevention, Directorate of Resource Management, and Civilian Personnel Office will implement a new policy. Starting in FY 96, each MTF will be individually accountable for controlling its civilian accident/injury rates and paying workers' compensation claims.

Each facility will receive a separate budget to pay for workers' compensation claims and will be responsible for its control. These FY 96 budgets will be based on FECA claims that were active and being paid upon by the MEDCOM facilities in FY 94. If individual MEDCOM MTF administrators cannot control their accident rates, any claims paid in excess of their allotted workers' compensation budgets will have to come from their Operations and Maintenance (O&M) accounts. In effect, this will divert funds away from their primary mission of direct patient care. Conversely, if MEDCOM administrators reduce their accident rates, any surplus in their workers' compensation budgets can be kept and used to augment the MTF in other operational areas.

Due to the ensuing implementation of this new policy in

FY 96, it is believed that this graduate management project will be timely and could assist MTF administrators to better identify, describe, predict, and control civilian work related injuries and diseases. It is hoped that this study will help reduce civilian employee injuries, the amount of workers' lost time, FECA claims, Continuation of Pay (CoP) benefits and makes the MEDCOM as competitive as possible as it moves into the new TRICARE managed care environment.

Statement of the Problem:

In FY 96, the U.S. Army Medical Command administrators will be faced with the direct control of their workers' compensation claims budgets. Medical and compensation claim payments have risen $4.1 million dollars or 69.5 percent since 1989. Claims costs exceeded $10 million dollars for the MEDCOM by the end of FY 94.

Most occupational injuries in the health care setting are avoidable. Predicting the nature of injuries to include lost time, and non-lost time injuries requires knowledge of the types of injuries most likely to occur and the civilian employees most at risk. The information from this graduate management project will assist MEDCOM administrators to identify, describe, predict, and control civilian injuries with the hope of reversing these trends. It may also help to reduce accident rates, the amount of lost time and the associated FECA claims paid.

The research question is: Can statistical analysis of historical accident information assist MEDCOM administrators to better identify, describe, predict, and possibly control work injuries and their related costs?

Literature Review

The main thrust of the literature review concentrates in four main areas. First, this review focuses on gaining background information about the history of occupational medicine. Second, this literature review explores what common elements have been studied in the past and what research findings were noted concerning occupational injuries in the civilian health care setting. Third, this section will research the informational and Total Quality Management (TQM) aspects of occupational injuries and their control. Finally, this review will concentrate on gaining an increased understanding about the current regulatory environment concerning occupational medicine and injury administration in which MEDCOM administrators work. Exploration of all of these areas provides a well-rounded foundation of understanding of the problem and gives direction to this research project.

History of Occupational Safety

Occupational safety began as a scientific discipline in the late 1800's. Due to the continuing hazards and accidents that the labor force was encountering during the

industrial revolution, businesses began to research the causes of accidents and the possible solutions to reduce losses (Walker 1988). This action was taken not for the purpose of protecting workers' welfare, but as a way to ensure that production and output would not suffer. During this same time period, labor unions concerned with employee safety also began to organize to protect workers and correct hazardous labor practices (Walker 1988).

Corporations began to employ safety practitioners. When these "specialists" were hired, the new field of Occupational Safety was born. Many company employees were given this function as an additional duty. This new field of science studied job environments, defined causes of accidental injuries and developed methods to control them (Walker 1988).

In 1912 the Milwaukee Safety Congress began an organized effort to reduce accidents in the work place. It later gave birth to the National Safety Council which continues today. In 1916 the American Occupational Medical Association was chartered. This organization's membership began its existence with general practitioner physicians who were interested in employee safety or who were employed as company doctors (Walker 1988). The efforts of these two groups drastically reduced the rate of work related fatalities throughout the twentieth century.

As the interest in safety programs has progressed, the

field of occupational safety has become more specialized (Walker 1988). The literature indicates that today this field is made up of numerous specialized duties and job titles. Jobs include safety engineers, industrial hygienists, occupational health nurses, and occupational physicians. One or all can be employed by an organization based on its size or complexity (Walker 1988).

State and federal government has through the years created agencies and enacted legislation to protect workers from job-related hazards. The Occupational Safety and Health Administration (OSHA), under the Department of Labor, has the responsibility of enforcement of safe work practices for federal government agencies. When an accident befalls a government employee, MEDCOM administrators have to deal with OSHA and the regulations of the Federal Employees' Compensation Act.

Studies Conducted in the Civilian Health Care Industry

The health care sector is the third largest employer in the United States (U.S. Department of Labor 1994). As of 1992, more than 11 million persons were working in health care and this number is expected to climb to twelve million by the year 2000 (Williams and Torrens 1993). Approximately 77 percent of these health care workers are women and 17 percent are nurses (Wilkinson et al. 1992).

The literature suggests that despite the apparent

assumption that hospitals and clinics are safe, they are among the most hazardous environments in which to work (Weaver et al. 1993 and Wilkinson et al. 1992). Statistics from the Department of Labor show that this is true. The lost time rate per 100 full time workers per year was 93.4 days for health care workers in 1992 (U.S. Department of Labor 1994). This rate for health care workers was almost 25 days higher when compared to all service workers in America. All service industry workers in the U.S. had a combined rate of 68.6 lost work days per 100 full time workers (U.S. Department of Labor 1994).

The nature and type of hazards and injuries that health care workers (HCW) are exposed to are diverse and unique. Unique hazards involving HCWs include: movement of patients, ionizing radiation, exposure to anti-neoplastic drugs, anesthetic waste gases, and infectious agents (Moore and Kaczmarek 1990). These hazards can result in an array of injuries and diseases that can affect a wide variety of HCW occupations. They include musculoskeletal injuries; slips, trips, and falls; needlesticks; cuts and contusions; tuberculosis; Hepatitis B; HIV; and exposure injuries caused by hazardous chemicals, radiation, and medications (Weaver et al. 1993, Wilkinson et al 1992, and Moore and Kaczmarek 1990).

A study by Weaver et al. analyzed incident reports at a large university medical center to identify those employees

who had the greatest exposure to hazardous chemicals. A total of 253 exposures occurred during the three years of reports sampled. The overall incidence rate was 8 years per 100 person years (Weaver et al. 1993). This study also looked at exposure or "attack" rates by job title, gender, and age of exposed employees. This research found that female housekeepers and maintenance workers between the ages of 25 to 44 had the highest rates of chemical exposure. This study found that disinfectants were the most common chemicals involved in the exposure incident. By statistical analysis of the data, the researchers drew conclusions as to the actions that could be taken to prevent future chemical exposures. Safer handling practices of disinfectants were implemented to correct the problems found in this study (Weaver et el. 1993).

In a study conducted at a large multi-hospital university system, Wilkinson et al. found that female workers were more than twice as likely to be injured than males (Wilkinson et al. 1992). Additionally, this same study found that health care workers in age groups 20 to 29 and 30 to 39 years old had the highest rates of injury, and that these injuries occurred most frequently between the fourth and seventh years of employment. The study indicated that new employees just starting out and employees who had worked a long time in a given position had the lowest injury frequencies (Wilkinson et al. 1992).

The literature in general indicates that workers in their middle work years become complacent or less careful on the job and thus sustain higher injury rates. The Wilkinson et al. study also found that the highest frequency of injury episode for health care workers was needlesticks, followed closely by sprains/strains, and then by lacerations and contusions (Wilkinson et al. 1992). This study found that forty-eight percent of all recorded injuries involved employees who provided direct care services to patients, such as nurses, nurses aides, and physicians.

Of the 1,513 injury episodes that occurred among the 9,663 employees during the thirty-two month study that Wilkinson et al. reviewed, ten percent of the population lost time from work and 16.5 percent of these cases had lost time in excess of 21 days (Wilkinson et al. 1992). This study used both descriptive statistics and chi-square inferential statistical analyses.

The researchers of this study when performing the chi-square tests for significance, excluded data on the accident reports that were recorded as unknown, unclassified, missing, or un-categorized. It is assumed, but not stated in this research, that this was done to avoid problems with content validity of the study's results.

Wilkinson also conducted a similar study in 1987. As in the follow-up study in 1992, the initial study collected data in several areas. It focused on the date that injury

occurred, the nature of the injury; the department to which the employee belonged; and the employee's age, gender, and length of employment. In this 1987 study however, he also captured data about workers' compensation costs by nature of injury and the department to which the employee belonged. He also differentiated injuries as either resulting in lost time or no lost time from work for the employee (Wilkinson 1987).

Wilkinson's analysis of the worker's compensation claims showed that back injuries per incident and in the aggregate cost the most. Injuries from slips and falls were the second most costly type of injury (Wilkinson, 1987). The department with the highest workers' compensation costs was nursing followed by hospital services. Hospital services in this organization, in which he drew the sample, included maintenance, supply, housekeeping, and linen functions (Wilkinson, 1987). It is interesting to note that in this study that needlesticks had the highest frequency rate of injury but very low compensation costs (Wilkinson, 1987). This earlier study by Wilkinson used only descriptive statistical analysis.

Another study that had similar research designs as the three previously mentioned was conducted at Kansas University Medical Center. This study reviewed 885 workers' compensation reports. Reports were reviewed to obtain frequency counts of traumatic injuries, days lost, and

medical and disability payments from July 1, 1983 to June 30, 1984 (Nueberger, Kammerdiener, and Wood 1988). Data were coded by age, gender, department, and job title. Frequency and severity of injuries and full time equivalency rates were calculated. A Two-tailed chi-square inferential statistical analysis was used to test for significant rate differences with a confidence interval of ninety-five percent for mean differences between injuries.

This study found that twice as many females than males reported injuries but those involving males accounted for more lost days. Total medical and disability costs were $160,663 for males and $166,233 for females and 63.4 percent of all reported claims resulted in lost time for all employees (Nueberger, Kammerdiener, and Wood 1988). The most frequent nature of accidents in this study sample was needle sticks.

The most severe and costly nature of injury reported in this study was lifting injuries; these resulted in the most days of lost time. Of the job titles examined in this study, nurses reported the greatest frequency of incidents. Nursing also reported the highest number of work days lost at 1,883 followed closely by personnel employed in the facility's operations department with 1,726 lost work days. The annual reporting rate was 19.26 per 100 work years (Nueberger, Kammerdiener, and Wood 1988).

Other occupational health research is more focused, in

that it concentrates on specific natures of injuries and the related occupations of employees effected by those injuries. One study found that younger, shorter, and less experienced health care workers are more susceptible to wrist injuries associated with repetitive motion tasks (Wild et al. 1992). This study concluded that medical clerks, warehouse material handlers, operating room supply personnel, and dental hygienists are particularly susceptible to carpal tunnel syndrome. Wild's study was unique in that it identified height as being predictive in the nature of an injury (Wild et al. 1992).

Several other studies focused on reducing risk of back injury of nursing personnel (Owen and Garg 1991, and Venning 1988). The major theme of these studies stated that back injuries are the most costliest and result in the greatest amount of lost work time for registered nurses, licensed practical nurses, and nurses aides. Educational, ergonomic, and administrative remedies to reduce and prevent back injuries were presented in these studies. These remedies included promotion of correct lifting practices, use of patient lifting devices and more frequent job rotations away from direct patient care areas. Follow-up results of these studies showed that frequent reminders to staff about using safe patient lifting procedures and equipment assisted in reducing the number of back strains in nursing personnel.

Several of these aforementioned studies indicated that

much of the information contained in their data sources about injuries could not be classified or was incomplete (Weaver et al. 1993; Wilkinson et al. 1992; Neuberger, Kammerdiener, and Wood 1988; Venning 1988; Wilkinson 1987). These studies indicated that most of their research data were obtained from accident/incident reports. One study explained that there may be a question of bias in the information that was reported on accident reports because of the different emphasis placed on accurate/timely reporting by various department heads (Wilkinson et al. 1992). Nueberger, Kammerdiener, and Wood stated that the information included on these reports and the conclusions drawn should be interpreted cautiously. They found that the entire process of accident reporting included language problems for Hispanics or Oriental employees, time pressures for supervisors, ignorance of what and when to report, and fear of disciplinary action for even having an accident. It appears that all of these problems associated in the completion of accident reports may make trend analysis more difficult and conclusions less generalizable for this project.

Despite the limitations of using accident/incident reports, the great majority of the studies reviewed stated that this information and the ensuing statistical analyses performed provided a better insight into identifying high risk health care workers that may be vulnerable to a

particular injury or exposure. The researchers noted that the results generated from their studies were a cost effective way to assist hospital management and/or occupational health personnel to better identify personnel most at risk.

The literature stated that with these high risk groups identified, management and occupational health personnel could then better develop training programs or take other actions to avoid or reduce accident and exposure rates in the future. By using statistical analysis of accident information Weaver et al.; Wilkinson et al.; and Neuberger, Kammerdeiner, and Wood reported that most accidents, injuries, or exposures can be avoided.

Use of Information and the Value of Total Quality Management in Maximizing Loss Control

Areas of study such as Medical Information Systems and Organizational Behavior and Management teach us that the use of information feedback is important in controlling the outcomes and outputs of various systems and processes of a health care organization. Also the new management philosophy of TQM espouses the tremendous importance of information in changing organizational culture and improving its performance. Theses areas of information sharing, data analysis, and TQM are pertinent topics of research with respect to accident prevention and reduction in the MEDCOM. They can prove to be useful tools to administrators.

Kongstvedt states that "providing regular and accurate data about...performance, from both a utilization and (for risk/bonus models) an economic standpoint, is vital to changing behavior." (Kongstvedt 1993, 920) He also believes that reports data needs to be meaningfully grouped and tailored to provide management with the information they require to effect positive changes that achieve organizational goals (Kongstvedt 1993). These factors could be applied to accident control in the MEDCOM.

Karen Wolfe, an occupational health nurse with a doctorate in epidemiology, contends that computerized information can be a powerful instrument in loss prevention and control. She states that information based loss and cost control can be achieved by: "1) Providing concurrent and continuing monitoring, resulting in a sentinel effect; 2) Influencing behavior through the use of information; 3) Providing objective and fair measurement of loss control performance and progress contributing to a positive management style and corporate culture." (Wolfe 1991, 40)

Wolfe states that many risk managers believe that accidents are avoidable if the factors that contribute to their actualization can be "identified, analyzed, and managed, thus preventing them from occurring." (Wolfe 1991, 40) She believes that the attitude of management and employees plays a larger role in the prevention of accidents than does environmental structure of the work site. Wolfe

promotes the idea that employees generally do what is asked of them by their supervisors and "safe work-place expectations must be communicated explicitly through management training, coupled with objective (computerized) feedback." (Wolfe 1991, 40) She states that bench marks are required by organizations to allow managers to determine how they are performing and to adjust activities accordingly (Wolfe 1991). Finally, Wolfe contends that information feedback is an important factor in controlling costs. She states that workers' compensation budgets should be allocated to the departments or cost centers that generated them. This information allows for better supervisor accountability and promotes bench marking. This practice also allows for analysis of organizational safety performance and to better modify worker's behavior. "Information facilitates self evaluation, positive reinforcement, and realistic problem solving." (Wolfe 1991, 41)

A study by Sahney, Dutkewych, and Schramm reviewed the total quality management (TQM) philosophies of Crosby, Demming, and Juran. As follows are the points found in their study of these giants in the field of TQM that are pertinent to this project: 1) Organization culture has a tremendous impact on the quality improvement process; 2) Management is responsible to initiate effective employee educational programs and to communicate information about

quality improvement throughout the organization; 3) Management and employees must learn the meaning of statistical thinking to include: how to communicate with data and manage with facts; how to take the guess work out of decision making; and how to reduce variation and costs through simple tools of measurement and statistical analysis (Sahney, Dutkewych, and Schramm 1989).

A review of a study completed at the University of Michigan demonstrates these TQM principles as they apply to loss control. It found that companies that have a positive corporate culture, exhibiting attributes such as concern for employee well being as demonstrated by employee communication, health and wellness programs, employee assistance programs, or profit sharing experienced significantly fewer accidents (Hunt et al. 1989). The study found that positive corporate culture can be fostered by use of information. With this information, empowered managers can identify problems early and reduce accident rates. The study concluded that "managers can manage if given proper decision support tools." (Hunt et al. 1989, 38) All of these areas may be useful topics to consider in identifying and controlling risk factors in MEDCOM civilian employees and the injuries they sustain.

The Federal Employees' Compensation Act (FECA)

The FECA as revised in May 1987 established a program to compensate civilian employees who become disabled through

injury, occupational disease or illness sustained in performing their duties. The program is administered by the Department of Labor's (DoL) Office or Workers' Compensation Programs (OWCP) (U.S. Department of Labor 1988). For all U.S. Army installations, a Federal Employees' Compensation Act administrator (program administrator) in the Directorate of Civilian Personnel is the focal point for the program (Whartley 1994).

The claims process begins when an employee reports an on-the-job traumatic injury, occupational disease or illness to the supervisor. The employee should report the claim on Department of Labor Form CA-1 Notice of Traumatic Injury and Claim for Continuation of Pay/Compensation or Form CA-2 Notice ofOccupational Disease and Claim for Compensation (U.S. Department of Labor 1988).

A traumatic injury represents an injury to the body caused by a specific event or incident such as lifting or falling. An occupational disease or illness results from a condition of the work environment such as stress over a long period of time.

For a traumatic injury, the command is obligated to continue to pay the employee up to 45 calendar days if the employee cannot work. This is referred to as continuation of pay. These payments are at full salary and benefits and are subject to taxes. They are paid out of the command's operations and maintenance funds, just as if the employee

was still on the job. Once continuation of pay eligibility has expired, the employee can request disability compensation by submitting a Form CA-7 Claim for Compensation on Account of Traumatic Injury or Occupational Disease (U.S. Department of Labor 1988).

If the disability continues beyond the period claimed on the Form CA-7, or previously submitted Form CA-8, the employee can claim continuing compensation by submitting a Form CA-8 Claim for Continuing Compensation on Account of Disability (U.S. Department of Labor 1988). Disability compensation pay can continue indefinitely if the employee has a work related permanent disability. Compensation is paid at two-thirds of the employee's pay rate if he or she has no dependents or augmented to three-fourths of the pay rate if the employee is married or has at least one dependent. These payments are not subject to any state or federal taxes (U.S. Department of Labor 1988). The FECA also provides for the payment of benefits to dependents if job related injury of disease is fatal to the employee.

Under the FECA, employees also have a right to have their medical care paid for. If the employee requires medical care because of a work related injury, the employee's supervisor should complete the front of Form CA-16 Authorization for Examination and/or Treatment. This should be done within four hours of the injury. In case of an emergency, the command may authorize medical treatment by

telephone. In this case, the employee has 48 hours time to submit a completed CA-16 to the command. The OWCP will pay for medical care indefinitely if the injury is determined to be work related (U.S. Department of Labor 1988).

The employee is entitled to initial selection of a physician or facility for treatment of an injury. Contrary to popular belief, a DAC employee does not have to be examined initially by an MTF physician. The regulations clearly state that "the employee's choice of their physician must be honored and not delayed." (U.S. Department of Labor 1988)

The OWCP uses a rate schedule of maximum allowable charges that it will pay for medical services rendered by various outpatient care providers. Under the FECA, however, the OWCP has no rate schedule or payment ceilings on care rendered to employees by hospitals, pharmacies, or nursing homes. The OWCP will pay billed charges for these types of services (U.S. Department of Labor 1988).

The literature review of these current policies found that the Department of Labor's Office of Workers' Compensation Programs adjudicates and administers all claims filed under the Federal Employees' Compensation Act. In the past, disbursements made by the Office of the Workers' Compensation Programs on each case were recorded and duly charged through the Department of the Army to the Army Surgeon General's (SGs) Office at the end of each fiscal

year. The SG's Office was responsible for the reimbursing of the Compensation Fund for the total disbursements made on behalf of AMEDD civilian employees. As mentioned before, compensation disbursements primarily consist of monetary benefits for loss of wages, permanent impairments, medical services, rehabilitation services, and survivor annuities (Whartley 1994).

Starting in FY 96, the MEDCOM will institute policy changes that will implement a charge back system down to the MTF level. The charge back system will be the mechanism by which the costs of compensation will be assigned to employing MEDCOM agencies at the end of the fiscal accounting period. This accounting period will run from 1 July to 30 June and will coincide with that of DOL's OWCP. MTFs and employing agencies in MEDCOM will be issued a target or budget for FY 96 based on current FY 94 case data and payments listed on the Civilian Resource Conservation Information System (CRISIS) FECA Nature of Injury or charge back report (Total Army Personnel Command 1994).

The FY 94 charge back report will be used as the basis of the MTF targets to be issued beginning in FY 96. MEDCOM MTF's will be responsible for reimbursing the MEDCOM which will in turn reimburse the Department of the Army (DA) which will reimburse the Department of Labor for all compensation costs paid on behalf of its employees. All compensation costs will be paid except for costs associated with death

and permanent disability cases. DA will still reimburses the Department of Labor for compensation costs related to these cases (Whartley 1994).

Purpose (Variables/Working Hypotheses)

There are two main purposes of this project. The first purpose is to perform a retrospective quantitative study to determine whether age, gender, occupation, month of the year, day of the week, employee MTF organizational peer group, cause, and source of an injury are predictive of nature of lost time and non lost time injuries for MEDCOM civilian employees. The second purpose of this project is to identify if the nature of injury sustained by civilian employees is predictive of the FECA compensation claims paid. The two hypotheses tested are:

Ha 1: Nature of injury is a function of age, gender, occupation, organization peer group of the employee; month of the year, day of the week of the occurrence; and cause and source of the injury/illness

Ha 2: Compensation claims paid are a function of nature of injury.

To accomplish the purposes of this project, the following objectives were met:

1. To gather information on the civilian personnel end strength of the MEDCOM in FY 94 in order to compute full time equivalency (FTE) rates. This allowed for the computation of annual accident rates and peer group bench marks.

2. To gather associated pay rates of MEDCOM civilian personnel so that continuation of pay costs could be computed.

3. To code the data in each injury/illness case to

allow for meaningful descriptive and inferential statistical analysis.

The goal of this research project is to enhance management's ability to predict and control those factors that impact on injuries and illnesses that befall their civilian employees. The results generated by this project should assist in the challenge they will face with their new responsibility of controlling the payment of FECA claims in FY 96.

CHAPTER 2

METHODS AND PROCEDURES

This project employs a research method similar to that used by Lieutenant William Storey, USN; Major Laurie Horn, USA; and this author. This previous study was conducted in the Spring of 1994 as a course requirement for Health Care Research Methods: Design and Analysis, for Dr. Kenn Finstuen in the didactic phase of U.S. Army-Baylor University Graduate Program in Health Care Administration.

The first hypothesis tests to see if nature of injury is a function of age, gender, occupation, organizational peer group of the employee, month and day that the injury happened, and source, and cause of the injury. The dependent and independent measures of this hypothesis are operationally defined in detail below and in Appendix 1.

The dependent measure for the first hypothesis of this quantitative study is called "Nature of Injury". It consists of sub-variables in five mutually exclusive, categorically exhaustive groups coded as back strain, multiple strains, puncture, contusion, and disease. Operationally defined, these dependent variables are the final diagnostic classification of a work related injury or

disease event that was sustained by a MEDCOM civilian employee. The event caused a CA-1 or CA-2 and a FECA claim to be filed and can result in lost time or no lost time from work being incurred by the civilian employee. FECA medical or compensation payments can be made during these events. The operational definitions of the five sub-groups of the dependent variables are as follows:

> Back strain: traumatic or disabling injury sustained chiefly to the back
>
> Multiple strains: traumatic or disabling injury sustained to other muscles, ligaments, tendons other than those in the back
>
> Puncture: traumatic penetrating injury through the skin, to include cuts, lacerations and needlesticks
>
> Contusions: traumatic injuries to include bruises, abrasions, burns, scalding, and fractures
>
> Disease: traumatic or disabling diseases; either infectious or congenital that are work-related; will include heart conditions, mental disorders, stress, respiratory problems, and infectious diseases such as tuberculosis and hepatitis
>
> (U.S. Army Safety Center 1990)

The selection of these dependent variables are based on the literature review, the information that has been presented in the data sources utilized for this project and the statistical judgement of the researcher.

This project's first hypothesis has forty-nine total factors grouped into eight sets of independent variables. These sets are age, gender, occupation, peer group, month, day, cause and source. The forty-nine factors were all coded into mutually exclusive categorically exhaustive sets

of sub-variables. They were also selected based on the literature review, the indices listed in the data sources and researcher judgement.

Operational definitions of the independent variables for hypothesis one follow. "Age" is categorized into five groups, broken down into increments of ten years, beginning with age twenty and ending with all ages sixty and over. The second category, "gender" has two sub-groups and are coded as male or female.

The third independent variable "occupation" is sorted by job series of the civilian employee who had the accident/illness, and is based on job descriptions provided in the Code Structure Index to Definitions of Trades and Labor Job Families and Occupations and from the Wage Grade Index (U.S. Office of Personnel Management 1993a and 1993b). Occupation is broken down into six categories which include direct care, ancillary services, administrative services, facility support, wage grade, and unspecified. More complete definitions of this variable is listed in Appendix 1.

The fourth independent variable "peer group" is categorized into six sub-groups. Peer group represents the relative size and work load intensity of the employee's parent MTF. More specifically, Peer Group 1 facilities have the highest volume and most intense work load. Peer Group 6 MTFs have the least. It includes all incidents involving

workers employed by the old HSC in FY 94. These organizations are the U.S. Army Dental Command, various headquarters, schools, research activities, and other field operating agencies. Peer group standards have been obtained from the U.S. Army's Directorate of Patient Administration Systems and Biostatistics Activities (PASBA) at Fort Sam Houston, Texas (U.S. Army PASBA 1994). Outlying clinic activities at various camps, posts and stations were combined with their parent facility in accordance with the list provided by PASBA (U.S. Army PASBA 1994). Peer groups and a detailed listing of their corresponding MEDCOM MTFs are arrayed in complete detail in Appendix 1.

The fifth independent variable is month. "Month" signifies the month of the year in which the accident happened. This variable is divided into twelve categories representing the twelve months of the year.

The sixth independent variable "day" stands for the day of the week that the accident happened. It is divided into seven categories representing each day of the week.

The seventh independent variable is the "cause" of the employee's injury or disease. It is divided into six sub-groups and it describes the objects or events such as equipment, circumstances, or actions causing the injury or disease.

The last independent variable included in the first hypothesis of this project is source. "Source" is defined

as the location or objects that acted as the starting point of the injury or disease. Source is divided into five subgroups and explanations are included in Appendix 1.

Descriptive statistics have been used and numerous tables are displayed. Additionally, stepwise regressional analysis has been used. The alpha level for inferential statistics was set at .05.

The second hypothesis tests to see if the amount of compensation paid for an accident is a function of the nature of the injury sustained. The dependent variable for this hypothesis is "claims paid." It is operationally defined as the amount of money paid out for each accident and is separated into medical and compensation claims. A complete explanation of these payments has been provided in the literature review. The amounts paid were extracted on a case-by-case basis from the data source. The independent variable for this hypothesis is "nature of injury." Descriptive statistical analysis has been used to test this hypothesis.

Additionally, accident/illness rates for each peer group and for the total MEDCOM have been computed. Lost time and non-lost time accident/incident rates are subgroups of this analysis. Knowing whether an accident is classified as lost time or non-lost time is important in determining its severity and associated costs. These rates have been computed using end of fiscal year civilian

personnel data from each MEDCOM MTF. This data was gathered from the Office of the Army Surgeon General (U.S. Army OTSG 1995) and Headquarters MEDCOM (U.S. Army MEDCOM 1995).

This personnel data has been sorted into the six peer groups. These peer groups are the same as the fourth independent variable used in the first hypothesis of this project. The accident/incident frequencies in each peer group have been compared to the full time equivalencies (FTEs) or work years in each peer group. The final rates computed in this analysis are accident frequencies per 100 work years. Accident frequencies per 100 work years is an often used epidemiological standard and was discovered in the literature review. These rates provide a basis of comparison between peer groups and act as a bench mark for specific peer group administrators to gauge their performance in controlling accidents or illnesses.

A final study was also conducted. Fiscal year end civilian payroll data from the U.S. Army MEDCOM Program and Budget Office was used to compute the estimated amount of continuation of pay (CoP) being paid in lost time injury cases. By knowing the fiscal year personnel end strength, an average salary per FTE was computed. As learned in the literature review, MTFs are obligated to pay up to 45 calendar days of continuation of pay out of O&M funds in traumatic lost time accident FECA claims. Even though a singular average estimated salary figure per peer group and

the MEDCOM has been used, an analysis of this type may provide some insight to MEDCOM administrators into the amount of wasted salary and "hidden" expenses they can incur in addition to the medical and compensation FECA charge back costs they will start to pay in FY 96. Sample calculations are provided in Appendix 2.

Case data for this project was drawn from several sources. The Army Safety Management Information System (ASMIS) (U.S. Army Safety Center 1990) data base provided demographic case data to include: case number, age, gender, MTF unit identification code, occupation, cause, source, severity, day, month, nature of injury, and claim payment information.

This data base includes information from the Civilian Resource Conservation Information System (CRISIS) MACOM FECA Nature of Injury Report (Total Army Personnel Command 1994). This data source contains all of the individual case claims payment history and is merged with ASMIS. The ASMIS data base thus contains information received by the DoL from CA 1 and CA 2 forms which are filed through local safety officers at the parent commands when the accident/illness is reported. This database allows for accurate project statistical and financial analysis of hypotheses one and two.

Within ASMIS, 164 key words are listed under which data is collected. From these words this researcher originally

selected 17 key words or categories of data for the study. With the assistance of safety technicians at the U. S. Army Safety Center, a data set matching the parameters was assembled in a paper and ASCII computer data file. A sample of the actual 92 page data set is included in Appendix 3 (U.S. Army Safety Center 1995).

The data set assembled included the MEDCOM employee's cases that are currently active and are being paid upon. These cases include lost time and non-lost time injuries sustained in the work place. The inclusive dates for the sample were from August 1964, the oldest active case, to 30 June 1994, the end of DoL's fiscal year. The range of dates used for this sample allows for review and analysis of the actual information that will act as the basis for the FY 96 FECA claims targets to be provided to each MEDCOM MTF.

With the assistance of a computer statistical software program, the ASCII computer data file was down-loaded to the researcher's personal computer to facilitate analysis and to eliminate extraneous human error brought on by the transfer and copying of data (Norusis 1993). Then a total of 278 descriptives listed under thirteen of the originally seventeen requested key words, were re-categorized into 53 subgroups of variables using the computer software program. The total number of cases that matched the parameters for study were 2,023. Five hundred and forty-one cases were identified as having missing data or having natures of

injury coded as "other" or "unclassified" and were eliminated for analyses of hypotheses one and two. For these two studies n = 1,482 accident/illness events. However, all 2,023 cases have been used for accident rate and continuation of pay analyses.

The data source reliability for this project may be suspect. Observation bias, as noted in the literature review, was a problem to some degree. As observed, some of the commands in the MEDCOM placed more emphasis on completing accident reports and had more complete information than others. However, data gathered and entered into ASMIS or CRISIS was obtained from a standard form. The standardization of accident forms, the large (n) sample sizes of 1,482 and 2,023 respectively, and the relatively large number of dependent variables minimized this bias (measurement error) and improved reliability. Statistical variance of the data in the sample, which are taken from the entire MEDCOM population, was maximized to the best of the ability of the researcher.

Content validity problems were minimized as best as possible. As mentioned above, 541 cases were eliminated from the sample for analyses of hypotheses one and two due to missing data. This ensured that unmeasured cases were not included as part of the overall descriptive and inferential statistical analyses of important parts of this project.

Ethical issues such as the right of privacy did, to some extent, enter into this study. The ASMIS and CRISIS data bases do contain fields that contain employees' names, addresses, and social security numbers (SSNs). This information is protected by the Privacy Act. This researcher completed the appropriate registration forms and obtained the proper authorizations from the U.S. Army Safety Center to review this data. The data, statistics, and analyses of this project does not report individuals' names or SSNs and thus protects the privacy of those subjects listed in the data base.

CHAPTER 3

THE RESULTS

The purposes and objectives of this project have been accomplished. This retrospective quantitative study has determined that the first alternative hypothesis should be partially accepted and the second can be fully accepted. For the first hypothesis, descriptive and inferential statistical results clearly show a strong functional relationship between natures of injuries and certain predictors such as the job site related descriptives of cause and source. In the analysis of hypothesis two, descriptive statistics support the concept that compensation claims paid are a function of the nature of injury sustained by the employee. In this analysis back strain is by far the most expensive type of injury.

Outcomes of the two additional studies of this project, to include computation of MEDCOM accident rates and estimation of continuation of pay costs are provided. The computation of accident rates by peer group shows that the MEDCOM's smallest facilities have the highest accident rates. Results of the analysis of estimated payment of CoP claims shows that the MEDCOM should have paid $6.2 million

in CoP benefits in FY 94. This would be in addition to the $10 million it paid in FECA medical and compensation claims. As follows in four separate sections, detailed data in each of these areas of study are presented.

Hypothesis One

Table 1 below indicates the total frequencies and descriptive statistics for hypothesis one. Of the 1,482 cases included in this analysis, the injury back strain had

Table 1.--Descriptive Statistics for Hypothesis One: Nature of Injury is a Function of Age, Gender, Occupation of Employee; Peer Group of Employing Organization; Month and Day of Occurrence; Cause and Source of Injury

Dependent Variable Nature of Injury=Y	Back Strain * % ** (Freq) 31.6 n=(469)	Multiple Strains % (Freq) 29.6 n=(438)	Puncture % (Freq) 4.6 n=(68)	Contusion % (Freq) 23.5 n=(348)	Disease % (Freq) 10.7 n=(159	Row Total % (Freq) 100.0 n=(1482)
Independent variables						
Age						
20 - 29	6.4 (30)	5.7 (25)	8.8 (6)	3.7 (13)	3.1 (5)	5.3 (79)
30 - 39	26.9 (126)	24.2 (106)	25.0 (17)	24.1 (84)	25.8 (41)	35.4 (374)
40 - 49	40.1 (188)	40.0 (175)	35.0 (24)	33.6 (117)	30.8 (49)	37.3 (553)
50 - 50	24.1 (113)	22.6 (99)	22.1 (15)	29.3 (102)	32.1 (51)	25.6 (380)
60 & Over	2.6 (12)	7.5 (33)	8.8 (6)	9.2 (32)	8.2 (31)	6.5 (96)
Gender						
Male	43.1 (202)	34.9 (153)	42.6 (29)	33.0 (115)	39.0 (62)	37.9 (561)

Table 1.--Continued

	Back Strain	Multiple Strains	Puncture	Contusion	Disease	Row Total
Female	56.9 (267)	65.1 (285)	57.4 (39)	67.0 (233)	61.0 (97)	62.1 (921)
Occupation						
Direct care	25.8 (121)	24.9 (109)	20.6 (14)	21.8 (76)	21.4 (34)	23.9 (354)
Ancillary support	9.2 (43)	7.3 (32)	8.8 (6)	5.7 (20)	10.1 (16)	7.9 (117)
Admin support	14.7 (69)	24.0 (105)	20.6 (14)	21.8 (82)	21.4 (34)	23.9 (305)
Facility support	8.5 (40)	7.1 (31)	5.9 (4)	7.5 (26)	9.4 (15)	7.8 (116)
Wage grade	18.8 (88)	18.5 (81)	26.5 (18)	20.4 (71)	8.2 (13)	18.3 (271)
Unspecif.	23.0 (108)	18.3 (80)	17.6 (12)	21.0 (73)	29.6 (47)	21.6 (320)
Peer Group						
Group 1	24.5 (115)	24.9 (109)	20.6 (14)	30.7 (107)	18.9 (30)	25.3 (375)
Group 2	27.5 (129)	20.5 (90)	16.2 (11)	17.8 (62)	22.0 (35)	22.2 (327)
Group 3	22.4 (105)	23.3 (102)	32.4 (22)	19.8 (69)	19.5 (31)	22.1 (329)
Group 4	9.8 (46)	14.4 (63)	14.7 (10)	10.6 (37)	17.0 (27)	12.4 (183)
Group 5	9.8 (46)	11.4 (50)	11.8 (8)	16.7 (58)	13.8 28)	12.3 (184)
Group 6	6.0 (28)	5.5 (24)	4.4 (3)	4.3 (15)	8.8 (14)	5.7 (84)
Month of Injury						
January	9.2 (43)	13.7 (60)	11.8 (8)	6.3 (22)	10.7 (17)	10.1 (150)
February	8.1 (38)	6.8 (30)	2.9 (2)	15.2 (53)	9.4 (15)	9.3 (138)
March	9.8 (46)	10.5 (46)	11.8 (8)	8.9 (31)	16.4 (26)	10.6 (157)

Table 1.--Continued

	Back Strain	Multiple Strains	Puncture	Contusion	Disease	Row Total
April	10.4 (49)	9.6 (42)	11.8 (8)	9.2 (32)	8.2 (13)	9.7 (144)
May	8.1 (38)	7.8 (34)	7.4 (5)	8.6 (30)	12.6 (20)	8.6 (127)
June	8.5 (40)	6.2 (27)	11.8 (8)	6.0 (21)	5.0 (8)	7.0 (104)
July	7.9 (37)	9.6 (42)	13.7 (9)	7.8 (27)	8.2 (13)	8.6 (128)
August	9.4 (44)	7.5 (33)	7.4 (5)	7.2 (25)	5.7 (9)	7.8 (116)
September	6.2 (29)	7.8 (34)	8.8 (16)	7.8 (27)	8.2 (13)	7.4 (109)
October	8.3 (39)	9.8 (43)	1.5 (1)	10.3 (36)	6.9 (11)	8.8 (130)
November	6.6 (31)	6.4 (28)	8.8 (6)	6.6 (23)	4.4 (7)	6.4 (95)
December	7.5 (35)	4.3 (19)	2.9 (2)	6.0 (21)	4.4 (7)	5.7 (84)
Day of Injury						
Sunday	5.3 (25)	5.7 (25)	2.9 (2)	3.7 (13)	1.3 (2)	4.5 (67)
Monday	15.1 (71)	19.2 (84)	14.7 (10)	14.7 (51)	20.8 (33)	16.8 (249)
Tuesday	17.7 (83)	17.1 (75)	14.7 (10)	20.7 (72)	19.5 (31)	18.3 (271)
Wednesday	18.8 (88)	16.4 (72)	30.9 (21)	20.7 (72)	18.9 (30)	19.1 (283)
Thursday	21.1 (99)	17.1 (75)	13.2 (9)	18.4 (64)	17.4 (28)	18.6 (275)
Friday	16.6 (78)	19.2 (84)	20.6 (14)	15.2 (53)	18.2 (29)	17.4 (258)
Saturday	5.3 (25)	5.3 (23)	2.9 (2)	6.6 (23)	3.8 (6)	5.3 (79)
Cause of Injury						
Vehicle, machinery	2.6 (12)	5.3 (23)	2.9 (2)	2.9 (10)	.6 (1)	3.2 (48)

Table 1.--Continued

	Back Strain	Multiple Strains	Puncture	Contusion	Disease	Row Total
Explosion, electrical, chem. fire	0.0 (0)	.2 (1)	0.0 (0)	2.6 (9)	17.0 (27)	2.5 (37)
Handling materials, patients	48.0 (225)	31.7 (139)	32.4 (22)	10.1 (35)	3.1 (5)	28.7 (426)
Falling objects, physical contact	2.3 (11)	4.3 (19)	25.0 (17)	21.6 (75)	1.3 (2)	8.4 (124)
Falls, slips	26.9 (126)	32.6 (143)	16.2 (11)	47.4 (165)	0.0 (0)	30.0 (445)
Unspecif.	20.3 (95)	25.8 (113)	23.5 (16)	15.5 (54)	78.0 (124)	27.1 (402)
Source of Injury						
Work area	25.6 (120)	38.4 (168)	22.1 (15)	44.5 (155)	5.0 (8)	31.4 (466)
Environ. condition, hazmat	2.3 (11)	1.8 (8)	1.5 (1)	7.5 (26)	22.6 (36)	5.5 (82)
Work equip, vehicles	5.1 (24)	8.2 (36)	10.3 (7)	6.6 (23)	15.7 (25)	7.8 (115)
Inanimate, animate objects	28.8 (135)	19.2 (84)	48.5 (33)	10.1 (35)	8.8 (14)	20.3 (301)
Unspecif.	38.2 (179)	32.4 (142)	17.6 (12)	31.3 (109)	47.8 (76)	35.0 (518)

* % = frequency of the accident per each sub-variable divided by the n of the nature of injury for that column

** (freq) = frequency of the accident for each row

Note: 541 cases excluded due to nature of injury coded as unspecified (U.S. Army Safety Center 1995)

the highest frequency (469) and percentage (31.6), followed closely by multiple strain with 438 injuries and 29.6 percent. Together, these two injuries accounted for 61.2

percent of the 1,482 cases studied. All percentages for the eight independent variables in the first five columns of table 1 reflect the frequency of each sub-category of independent variable in comparison to each of the five natures of injury.

The first independent variable studied noted that there was a tendency for younger (20-29; 5.3%) and older (60 and over; 6.5%) employees to have lower rates of injury, placing the highest rate in the 40-49 year old age group (37.3%).

Results of the second independent variable gender, indicates that females sustain nearly twice as many injuries (62.1%) as males (37.9%). Males however achieve some parity with females in receiving back strains (43.1%).

The third independent variable shows that employees in direct care occupations encounter the highest injury rates (23.9%) as compared to all others. It is also interesting to note that this same group sustains roughly an equal percentage of all five natures of injury sustained. The second highest category of occupation sustaining injuries is the unspecified group (21.6%). This indicates that the employee's occupation series was not included on the accident form.

Descriptive statistics of the fourth independent variable indicate a proportional relationship between the size and work load volume of the MTF and frequency of injuries. Peer Group 1 had the highest rate (25.3%) and

successively decreasing to Peer Group 6 with a rate of 5.7%.

Data results of the fifth independent variable shows that the months of March and January accounted for 10.6% and 10.1% of injuries/illnesses respectively. The month of December was lowest with 5.7%. With the highest and lowest values happening in winter, the months of the year and seasonality analysis of accidents in this project appears inclusive.

Results of the analysis of independent variable six indicated that accidents happened most frequently on Wednesdays (19.1%). With respect to the day of the week, the seven day's frequencies were "bell shaped" with the lowest rates occurring on Sundays, increasing and peaking on Wednesdays, then decreasing again and bottoming out on Saturdays. This may be directly related to work load volume. Further study may indicate that MEDCOM facilities are busiest at mid-week.

The causes of falls, slips, trips (30.0%) and the handling of materials/patients (28.7%) made up a 58.7% contribution rate to all injuries when analyzing the seventh independent variable. These two sub-groups were followed closely by causes that were unspecified (27.0%). The 78.0% rate of unspecified causes of disease may be attributed to the fact that when an employee files a CA-2 for an occupational disease, the disease's cause may truly be unknown and take a longer time to identify than causes of

traumatic injuries. The analysis of causes also indicates that the handling of materials/patients attributed to 48.0% of all back strain injuries.

Review of the eighth independent variable set indicates that unspecified sources (35.0%), inanimate/animate objects (28.8%) and the employee work area (25.6%) accounted for a considerably large (89.4%) of the locations or actions that acted as the starting point of injuries for MEDCOM employees. This unspecified source is the largest "unclassified" element on table 1.

In order to perform inferential statistical analyses, a zero-order correlation matrix was generated with the assistance of a computer software package (Norusis 1993). Table 2 shows all of the significant Pearson's correlations among the variables identified by the computer in the hypothesis one analysis. The two tail test for significance was used to compute this matrix because the directions of the relationships among the numerous variables were difficult to visualize and could not be determined in advance. The matrix in table 2 provided an informative tool in which to perform exploratory inferential data analysis. It also assisted in the choosing of those variables that had the highest correlation coefficients for inclusion into a stepwise regression analysis of hypothesis one. All coefficients of variables with two asterisks (**) had

Table 2.--Zero-Order Correlation Matrix for Hypothesis One

n = 1482	Back Strain	Multiple Strain	Puncture	Contusion	Disease
<u>Age</u>					
Fifties					.0511*
Sixties	-.1083**				
<u>Gender</u>	.0732**			-.0549*	
<u>Occupation</u>					
Admin spt	-.0977**	.0555*			
Wage grade					-.0977**
Unspecified		-.0524*			.0671**
<u>Peer Group</u>					
Group 1				.0694**	-.0513*
Group 2	.0893**			-.0568*	
Group 3			.0536*		
Group 4	.0525*				
Group 5	-.0538*			.0714**	
<u>Month</u>					
January		.0768**		-.0698**	
February		-.0549*		.1128**	
March				.0649**	
October		-.0566*			
December	.0528*				
<u>Day</u>					
Wednesday			.0658*		
Sunday					.0544*
<u>Cause</u>					
Vehicle, machinery		.0736**			-.0511*
Explosion, elec., fire	-.1089**	-.0942**			.3218**
Falling obj. phys. cont.	-.1480**	-.0943**	.1317**	.2638**	.0890**
Material, patient handling	.2891**			-.2287**	.1961**

Table 2.--Continued

	Back Strain	Multiple Strain	Puncture	Contusion	Disease
Falls, trips, slips			.0663*	.2101**	-.2271**
Unspecif.	-.1051**			-.1446**	.3966**
Source					
Work area	-.0858 **	.0964**		.1563**	-.1972**
Environ. condition, hazmat	-.0949**	-.1050**			.2594**
Work equip, vehicles, tools	-.0672**				.1032**
Inanimate, animate objects	.1433**		.1533**	-.1412**	-.0991**
Unknown			-.0796**		.0934**

* critical value <.05, two tailed

** critical value <.01, two tailed

critical values < .01 and those with one asterisk (*) had critical values < .05.

The matrix produced fifteen variables having correlations with back strain injury. Back strain was the only dependent variable to have correlations with seven of the eight independent variable groups. Summaries of the other four dependent variables show multiple strains, punctures, contusions, and diseases with 10, 6, 13, and 16 correlations respectively.

A computer generated stepwise regression analysis was used to test the significance of all of the independent variables identified on the zero-order correlation matrix

with each of the five dependent variables. One stepwise regression analysis on each of the dependent variables to include back strain, multiple strains, punctures, contusions, and disease was performed and the results of each are in table 3. These findings indicate the unique contributions of the independent variables to the

Table 3.--Results of Stepwise Regression Analysis of Hypothesis One

n = 1482	*b*	df	*F*	*p*
BACK STRAIN = Y1		(10, 1471)	22.68621	.0000
15 Independent variables entered				
Age				
* 60 & over	-.172353			.000
* Gender	.054679			.000
Occupation				
* Admin spt	-.067939			.000
Peer Group				
* Group 2	.093374			.000
Group 5	-.027409			>.100
Group 6	-.031407			>.100
Month				
* December	.101010			.000
Cause				
* Explosion, elec. chemical fire	-.305996			.000
* Handling materials, patients	.241917			.000
* Falling objects, physical contact	-.224958			.000
* Unspecified	-.069011			.000
Source				
Work area	-.045129			>.100
Environmental condition, hazmat	-.040899			>.100
Work equip, vehicles, tools	-.042644			>.100
* Inanimate, animate objects	.087427			.000
Constant = .265824	*R* Squared = .13362			

Table 3.--Continued

	b	df	*F*	p
MULTIPLE STRAIN = Y2		(6, 1475)	11.28263	.0000
10 Independent variables entered				
Month				
* January	.105016			.000
February	.044412			>.100
October	.028988			>.100
Occupation				
Admin spt	.045625			>.100
Unspecified	-.043227			>.100
Cause				
* Vehicle, machinery	.173469			.000
* Explosion, electrical chemical fire	-.223517			.000
* Falling objects, physical contact	-.163160			.000
Source				
* Work area	.080848			.000
* Environmental condition, hazmat	-.173551			.000
Constant = .282712	R Squared = .04388			
PUNCTURE = Y3		(3, 1478)	22.04332	.0000
6 Independent variables entered				
Day				
* Wednesday	.034049			.000
Peer Group				
Group 3	.042639			>.100
Cause				
* Falling objects, physical contact	.091317			.000
Falls, trips	-.007061			>.100
Source				
* Inanimate, animate objects	.076756			.000
Unspecified	-.016292			>.100
Constant = .016152	R Squared = .04283			

Table 3.--Continued

	b	df	*F*	*p*
CONTUSION = Y4		(8, 1473)	38.35427	.0000
13 independent variables entered				
* Gender	-.042734			.000
Month				
January	-.079041			.000
* February	.130384			.000
March	-.013699			>.100
Peer Group				
* Group 1	.081626			.000
* Group 2	-.003623			>.100
Group 5	.094580			.000
Cause				
Handling materials, patients	-.037825			>.100
* Falls, trips	.218327			.000
* Falling objects, physical contact	.478781			.000
Unspecified	.002687			>.100
Source				
Work area	.047428			>.100
* Inanimate/animate objects	-.093528			.000
Constant = .127835	*R* Squared = .17239			
DISEASE = Y5		(6, 1475)	122.70395	.0000
16 independent variables entered				
Age				
50-59	.031956			>.100
Occupation				
Wage grade	-.029053			>.100
Unspecified	.022898			>.100
Peer Group				
* Group 1	-.041815			.000
Day				
Sunday	-.023651			>.100
Cause				
Vehicles, mach.	-.017232			>.100
* Explosion, fire	.634469			.000
* Handling materials, patients	.024411			>.100
Falling objects, physical contact	.017769			>.100
Falls, slips	-.030542			>.100
* Unspecified	.273655			.000

Table 3.--Continued

Source	*b*	df	*F*	*p*
Work area	-4.729E-04			>.100
* Environmental condition, hazmat	.264232			.000
* Work equipment, machinery, tools	.102449			.000
Inanimate, animate objects	4.097E-04			>.100
* Unspecified	.078515			.000

Constant = .022216 R Squared = .33295

* indicates a statistically significant predictor of the injury analyzed

five natures of injury and the results support the first alternative hypothesis of this study. While the regressional analyses were being computed, the statistical computer software automatically removed those independent variables that made contributions at a significance level of p >.100 (Norusis 1993).

Each of the five stepwise regression analyses produced separate inferential statistics for only those independent variables that remained in each equation and were identified as statistically significant predictors of the nature of the injury tested. The regression analysis of back strain identified ten sub-variables that were statistically significant predictors and had an R squared of .13362. Selected results of the five regressions are listed in table 4. The regression of disease produced the highest R squared value of any of the five analyses. Its six statistically significant predictor variables accounted for 33.3 % of the

shared variance of all factors resulting in a disease.

Table 4.--Summary of Selected Results of Stepwise Regression Analysis of Hypothesis One

n = 1,482 Dependent <u>variable</u>	Predictors Entered	Predictors Identified p<.000	Major Set Identified w/Variables p<.000	R^2	F	p
Back strain	15	10	7	.13362	22.68621	.0000
Multiple strains	10	6	3	.04388	11.28263	.0000
Punctures	6	3	3	.04283	22.04332	.0000
Contusions	13	8	5	.17239	38.35427	.0000
Disease	16	6	3	.33295	122.70395	.0000

The major independent variable sets of cause and source both yielded at least one statistically significant predictor each for the five dependent variables studied. These findings indicate source and cause may be universal predictors for all injuries and diseases. Administrators may be able to concentrate their efforts in these two areas to prevent most types of claims.

Hypothesis Two

The second hypothesis of this graduate management project tested to see if claims paid are a function of nature of injury sustained by MEDCOM civilian employees. Table 5 provides descriptive statistics for this study. Results clearly show that the MEDCOM spent more on back

Table 5.--Descriptive Statistics for Hypothesis Two: Claims Paid Are a Function of Nature Injury

n = 1482 Dependent variable claims paid = Y	Medical Costs * % ** (Frequency)	Compensation Costs * % ** (Frequency)	Total Costs * % ** (Frequency)
Independent variables			
Back strain	42.6 ($1,013,594)	43.6 ($2,379,371)	43.3 ($3,392,965)
Multiple strain	24.8 ($590,521)	18.8 ($1,027,830)	20.7 ($1,618,351)
Puncture	2.2 ($53,071)	1.9 ($103,583)	2.0 ($156,654)
Contusion	23.7 ($564,240)	20.1 ($1,094,363)	21.2 ($1,658,603)
Disease	6.7 ($156,008)	15.6 ($847,537)	12.8 ($1,003,545)
Total	# 30.4 ($2,377,435)	# 69.6 ($5,452,683)	100.0 ($7,830,118)

* frequency of costs per each independent sub-variable divided by the column total dollars

** dollars spent on each nature of injury (independent variable)

reflects cost category total divided by total claims paid

Note: cost figures of 541 cases excluded due to missing data or having natures of injury coded as unspecified.
(U. S. Army Safety Center, 1995)

strain injuries in all cost categories than on any other identified nature of injury. Rankings of injuries from highest to lowest total costs are back strain,contusions, multiple strains, diseases, and punctures. Injuries involving the musculoskeletal system (back and multiple strains) accounted for roughly two-thirds (64.5%) of all claims paid. The data reflect that

Table 6.--Non Lost Time (NLT) and Lost Time (LT) Descriptive Statistics and Average Costs Per Claim

n = 1482 Independ. variable	Back Strain	Multiple Strains	Puncture	Contusion	Disease	Row Total
% of total cases	31.6	43.8	4.6	23.5	10.7	100.0
Frequency	469	438	68	348	159	1,482
Non lost time statistics by injury type						
% NLT cases	16.0	34.5	41.2	31.9	46.5	29.6
Frequency	75	151	28	111	74	439
Medical costs	$121,039	$207,011	$21,666	$119,071	$66,063	$534,852
Comp. costs	+$312,177	+$288,327	+$ .00	+$247,603	+$312,893	+$1,161,001
Tot.NLT costs	$433,216	$495,338	$21,666	$366,674	$378,956	$1,695,853
Avg cost/ NLT claim	$5,776	$3,280	$774	$3,303	$5,121	$3,863
Lost time statistics by injury type						
% LT cases	84.0	65.5	58.8	68.1	53.5	70.4
Frequency	394	287	40	237	85	1,043
Medical costs	$892,555	$383,510	$31,404	$445,168	$89,945	$1,842,582
Comp. cost	+$2,067,194	+$739,502	+$103,583	+$846,760	+$534,644	+$4,291,683
Total LT cost	$2,959,749	$1,123,012	$134,987	$1,291,928	$624,589	$6,134,265
Avg costs/ LT claim	$7,512	$3,913	$3,375	$5,451	$7,348	$7,507
Total claims cost per injury	$3,398,965	$1,618,351	$156,654	$1,658,603	$1,003,545	$7,830,118
Avg cost per case /injury	$7,234	$5,467	$2,304	$4,766	$6,312	$5,283

compensation costs accounted for almost 70% of all FECA claims paid on identified injuries in the MEDCOM in FY 94.

Outcomes of another type of analysis of costs support the concept that nature of injury is predictive of the amount of claims paid. In table 6, an analysis of the severity of each injury has been conducted. Frequencies of each no lost time (NLT) and lost time (LT) injury were compared to their respective medical and compensation costs. Each LT injury results in up to 45 calendar days or 3.2 pay periods of CoP. Results from table 6 show that back strains are the most costliest NLT and the more frequent and expensive LT injury than any other type of claim. Collectively, back strain cost the MEDCOM nearly $3.4 million in FY 94. Conversely, this analysis shows that puncture injuries are the least severe and lowest cost accidents sustained by MEDCOM civilian employees. However, it must be remembered that each dirty needle stick has the potential of incurring the costs of treating an employee who has contracted AIDS.

Computation of MEDCOM Accident Rates

Table 7 shows the accident/illness rates per 100 work years for each MTF peer group and for the MEDCOM. These rates were computed for each peer group in order to provide MEDCOM administrators bench marks to allow for comparison of their own facility's rates. MTF administrators might use the total MEDCOM population accident rate of 7.63

incidents/100 work years for relative comparisons between specific accident rates of peer groups and as a basic guide to interpret overall risks of the entire command to the civilian health care sector.

Table 7.--Accident/Illness Rates Per 100 Work Years, By Peer Group and for the MEDCOM

n = 2023	Work Yrs.	NL Time Incidents	NLT Rate/ 100 Wrk. years	LT Incidents	LT Rate/ 100 Wrk. years	Total Incidents	Total Rate/ 100 Wrk. years
Peer Group							
Group 1	6,623	164	2.48	335	5.06	499	7.54
%	* 25.0	# 32.9		# 67.1		* 24.7	
Group 2	5,537	140	2.52	325	5.87	465	8.39
%	* 20.9	# 30.1		# 69.9		* 23.0	
Group 3	6,222	135	2.17	332	5.33	467	7.50
%	* 23.5	# 28.9		# 71.1		* 23.1	
Group 4	2,866	81	2.83	176	6.14	257	8.97
%	* 10.8	# 31.5		# 68.5		* 12.7	
Group 5	4,021	71	1.77	155	3.85	226	5.62
%	* 15.2	# 31.4		# 68.6		* 11.2	
Group 6	1,228	49	3.99	60	4.89	109	8.88
%	* 4.6	# 45.0		# 55.0		* 5.4	
MEDCOM totals	26,497	640	2.41	1,383	5.22	2,023	7.63
%		31.6		68.4		100.0	

* percentage figure reflects frequency divided by column total

percentage figure reflects frequency divided by peer group (row) total incidents

Work year figures were received from the Manpower Management Office, OTSG, in the form of FTE, part time, and intermittent employee FY 94 year end strength figures. Each part time employee statistic was weighted as one-half work

year and intermittents as one-quarter work year so that full work year figures could be aggregated to produce the first column of table 7.

Accident rates in each category were computed using the following formula: Peer group work years times .01 divided by number of incidents per category, e.g. 6,623 total work years for Peer Group 1 times .01 divided by 164 NLT incidents reported for Peer Group 1 equals 2.48 NLT accidents per 100 work years for Peer Group 1. The n or sample size for this analysis was 2,023. No cases had to be eliminated from this study because of missing data.

The results of table 7 indicate that civilian employees belonging to the smallest facilities, with the smallest total of work years, had the highest NLT, and total accident rates of 3.99, and 8.88 accidents per 100 work years respectively. Peer Group 5 employees sustained the lowest rates at 1.77, 3.85, and 5.62 for NLT, LT, and total incidents when compared to all other MEDCOM peer groups. Ranges among the highest and lowest rates in the six peer groups were a 2.22 difference for NLT incidents, a 2.29 accidents/100 work years difference in the LT category, and a 3.26 rate range in the total category.

Computation of Continuation of Pay Benefits

Results of table 8 provide estimated continuation of pay for each peer group and for the MEDCOM. Unlike medical and compensation FECA claims payments that are clearly

reported by the DoL, the costs of CoP are more hidden and not presently identified as an MTF operating expense. This analysis shows that CoP benefits can be costly.

Table 8.--Estimated Continuation of Pay (CoP) By Peer Group

n = 2023	a + Work Yrs. End Strength	b ++ Total Payroll (millions)	c * Average Annual Salary	d ** Avg Pay Period Salary	e # LT Cases	f ## Estimated CoP
Peer Group						
Group 1	6,623	$269.6	$40,707	$1,566	335	$1,629,421
Avg cost						$5,011
Group 2	5,537	$211.7	$38,234	$1,470	325	$1,528,800
Avg cost						$4,704
Group 3	6,222	$205.2	$32,980	$1,268	332	$1,347,123
Avg cost						$4,058
Group 4	2,866	$110.5	$38,555	$1,483	176	$835,226
Avg cost						$4,746
Group 5	4,021	$119.9	$29,818	$1,147	155	$568,912
Avg cost						$3,670
Group 6	1,228	$41.1	$33,388	$1,284	60	$246,528
Avg cost						$4,109
Total MEDCOM	26,497	$958.0	$36,155	$1,391	1,383	$6,156,010
Avg cost						$4,452

\+ end strength figures from the Manpower Office, OTSG

++ payroll expenditures from U. S. Army MEDCOM, Program and Budget Office

* average annual salary computed by dividing column b by column a.

** average weekly salary computed by dividing column c by 26.

\# lost time cases from ASMIS data set.

\## estimation of CoP assumes that employee receives 45 calendar days or 3.2 pay periods of CoP per lost time case.

Basic assumptions were made to come up with the results

of table 8. Table results assumes that each LT incident reported in the 2,023 case sample pays the full 45 day entitlement or 3.2 pay periods of CoP.

The data of table 8 shows that Peer Group 1 had the highest total expenditure for CoP ($1,678,752) and the highest per incident average cost ($5,011). Peer Group 6 had the lowest aggregate total ($246,528) and Peer Group 5 the smallest average cost for CoP per incident at $3,670. Results of this analysis indicate that the MEDCOM would have paid $6,156,010 or $4,452 per claim in CoP in FY 94.

Table 9.--Estimated Total Expenditures For FECA Medical and Compensation Claims, and for CoP Benefits by the U.S. Army MEDCOM in FY 94

n = 2023			
Medical costs	$3,290,397		
Compensation costs	+ $6,761,326		
Total of current FECA claims per ASMIS		= $10,051,723	
Lost time cases	1,383		
Times pay periods	x 3.2		
of average pay period salary per lost time case	x $1,391		
Total estimated CoP benefits paid in FY 94		= $6,156,010	
Total estimated losses MEDCOM wide in FY 94			$16,207,733

The MEDCOM aggregate total of CoP is more than half of the total FECA medical and compensation claims paid in FY 94. Table 9 shows an estimation of total expenditures for the MEDCOM. When CoP expenses are added to the $10,051,723 spent on medical and compensation payments, it is estimated that the MEDCOM would have paid a grand total of $16,257,064 for all occupational injuries and illnesses in FY 94.

CHAPTER 4

DISCUSSION

The literature documents that health care workers are at high risk of occupational illness or injury (Weaver et al. 1993; Wilkinson et al. 1992; Nueberger, Kammerdiener, and Wood 1988: Venning 1988; Wilkinson 1987). These same authors found in their research that back injuries pose a substantial threat to health care organizational productivity and employee well-being.

After evaluating 1,482 injury/illness cases for hypotheses one and two, it is clear that back strain injuries pose the most serious threat to the MEDCOM's own productivity and employee welfare. The following discussion about the results found in this graduate management project should illuminate the seriousness of the problem with back strain accidents in the MEDCOM and motivate administrators to take appropriate actions to reduce their devastating effects.

This study shows that back strains are the most frequent, severe, and costly in terms of medical, compensation and CoP claims expenses. Further analysis also indicates that back strain injury problems are broad in

scope. The stepwise regression statistical outcomes of this project identified back strains as having the highest number of predictors when compared to the other injuries studied. The ten statistically significant predictor variables of this pervasive injury involve a wide range of demographic, organizational, and job-site related factors.

Back strain frequency of occurrence, which totaled 469 incidents of all 1,482 sampled in hypothesis one, substantially drives up its associated costs as discovered in hypothesis two. These large associated expenses with back strains are made more evident by the fact that even though this nature of injury only accounted for 31.6% of all incidents, compensation costs totalled $3,392,965 or 43.3% of the entire $7,830,118 spent on all injuries and diseases.

Injuries resulting in back strain were the most costly in the NLT injury category when compared to all others studied. The seventy-five NLT back strain cases that were identified out of the entire category's total of 439, had the highest per NLT case cost of $5,776. This figure was $655 per case higher than the next most costly average NLT injury case.

Back strain was also the most frequent and expensive type of LT case. Three hundred and ninety-four LT back strains accounted for $2,959,749 of claims expenses. Each LT back strain averaged $7,512 per case. These figures exceed the next most expensive LT aggregate injury claims

total and average per claim case cost figures by $1,667,821 and $166 respectively. Collectively, NLT and LT back strain accident cases cost the MEDCOM $7,234 or $922 more per case than any other type.

This high number of LT back injuries also drives up the amount of lost work days and CoP costs. In accordance with FECA regulations, each LT case allows for the payment of 45 calendar days of CoP benefits. During these 45 calendar days, a facility theoretically looses an employee's services and pays for up to thirty work days of lost, unproductive time, or 3.2 pay periods of salary. In a worse case scenario, the 394 LT back strain cases could have accounted for up to 11,820 work days or roughly 47 man years of lost productivity to the MEDCOM in FY 94. These same lost work days, due to back strain accidents, would have cost the MEDCOM $4,383 per case for a total of $1,726,902 in CoP benefits.

Due to these results, it should be obvious to all MEDCOM administrators and occupational safety personnel that immediate action must be taken in preventing the occurrence or at least controlling the severity of back strain injuries. Toward that end, the use of inferential statistical analyses, as shown in this study, may provide MEDCOM leadership a quantitative non-initiative tool to identify, predict and control the environment around them and decrease the occurrence of back strains.

The process of inferential analysis assisted in identifying ten predictors of back strain injury in a systematic way. It narrowed the scope of the search for all possible factors down to ten. These predictors give administrators concrete targets to consider when trying to control back strains.

Negatively speaking, the ten factors identified, may be too numerous to control and thus reduce this type of accident outcome. Additionally, the strength of the inferential analysis of functional relationships of the ten variables and their unique contribution to back strains are relatively weak with an R squared value of only .13362. In other words, these ten variables only accounted for 13.4% of the shared variance of all factors contributing to injuries resulting in back strain. Based on these results, any actions taken to control back strain accidents should be tempered with caution.

However, administrators can use the results of the inferential analysis on back strains to make determinations about the factors identified. Review of the *b* values of table 3 show that there are ten predictors that either increase or decrease the possibility of a back strain occurring. The five factors with positive *b* values increase the likeliness of back strain. In order of importance they are: (1) an employee handling materials/patients, (2) the injury happening in the month of December, (3) the employee

being a staff member of a Peer Group 2 MTF, (4) inanimate or animate objects acting as the injury's starting point, and (5) the employee being a male.

Those statistically significant factors with negative *b* values decrease the likeliness of a back strain occurring. In order of importance they are: (1) the cause of the accident being an explosion, electrical or chemical fire, (2) the cause of the accident due to falling objects or physical contact, (3) employees being 60 years old or older, (4) the cause of the accident being unspecified, (5) the employee having an administrative support type of occupation. With this information, MEDCOM administrators could start to tailor back injury prevention programs that target various job site hazards or specific groups of employees.

Possible reasons for the high incidence and cost of back strain in the MEDCOM are numerous. Possible causes are lack of proper education in correct lifting procedures and body mechanics, poor physical conditioning of staff, non-use of mechanical lifting devices, the employee's gender and organization culture have been cited in the literature (Owen and Garg 1991; Jacobson 1990; Venning 1988).

The statistics from this project show that employees, age 40-49, sustained 40.1% of all back strains. This may signify employees in this age group are less attentive to correct lifting procedures, are in a low state of physical

conditioning, or a combination of both. Analysis of gender shows that both females and males sustain a higher number of back strains than any other type of injury and may be directly related to the high frequencies of direct care and wage grade employees sustaining the same. It is not difficult to assume that direct care employees contain a majority of female employees such as nurses and nurses-aides, and wage grade occupations such as construction tradesmen and supply workers are traditionally more male. These assumptions could explain this phenomena.

Employees in Peer Groups 1 and 2 sustained the most back strains. This may be attributed to organizational culture or work intensity. The high costs of back strains could be attributed to lengthy medical care/therapy and the convalescence time associated with this type injury. The civilian industry now uses case management to track individual's medical care and recuperation time to lessen the associated costs of back strains and all other expensive occupational injuries (Jacobson 1990a and 1990b). The goal of case management is to return the injured employee to work as soon as possible. Case management could provide assistance to the MEDCOM.

The problem of uncoded or missing information that was cited in similar studies in the literature review (Mc Neely 1991) did manifest itself for this project. Several cases contained in the ASMIS data base had important elements

coded as unspecified or unknown. The extent of this missing information was made evident as 541 of the original 2,023 cases sampled, had to be eliminated from the analyses of hypotheses one and two due to natures of injury coded as unspecified. This constituted a 26.7% reduction of the original data set.

Unspecified data also makes identification of individual predictive risk factors more difficult and less valid. Three independent variables had sub-groups coded as unspecified. This researcher had to include cases with 320 unspecified occupations, 402 unknown causes, and 518 unidentified sources in order to retain the rest of the valuable information contained in these cases.

The independent variable of unknown cause had the highest correlation coefficient on table 2 and one of the highest *b* values recorded on table 3 in comparison to any other value computed for these two tables. Additionally, unspecified cause and source were identified in the stepwise regression analysis as being statistically significant predictors of disease. It would have been beneficial to know these "unknown" causes and sources. However, they may be a normal occurrence of medical science due to the long time required to identify definitive diagnoses for some types of diseases.

It is troubling that large groups of data with such powerful statistics did little to enhance the informational

specificity and predictive capability of this graduate management project. However, it was all that was available. The current quality of data utilized in this project will be the same in the future for MEDCOM administrator use unless efforts are made to improve its collection and completeness.

One of the reasons for this problem of unspecified data can be directly attributed to complete information not being captured during the initiation of the CA-1 or CA-2. There are many opportunities for data entries on these forms to be completed. Once these forms are initiated, they pass from the MTF to the FECA administrator's office in the Directorate of Civilian Personnel at each post. At this point, the FECA administrator should pass copies of these forms to the post safety office and to the regional office of the DoL OWCP prior to the information being entered into the CRISIS and ASMIS data bases. The employee, the MTF occupational safety staff, the FECA administration office, and the post safety office all have the opportunity to fully complete these accident forms.

In reviewing the data set of this project, this researcher noticed that there was a wide variance in the degree of completeness of information captured among some posts. Table 10 provides a sample of the completeness of accident information in the ASMIS about MEDCOM civilian employees claims from five selected installations.

The results show a wide range of completeness among

reporting posts and could be a reflection of a difference in staffing, program organization, or command emphasis. MEDCOM administrators can take heart as similar unspecified results are reported in Department of the Army accident statistics. Unspecified natures of injury and causes of accidents accounted for 16.1% and 32.0% of LT cases reported in DA statistics in FY 92 (Whartley 1994). The solution to this problem could be as simple as appointing one office on each

Table 10.--Sample of Completeness of Accident Information in ASMIS on MEDCOM Civilian Employees from Five Installations

Sample Post	Number of Cases	/---Number of Variables Coded as Unspecified---/			
		Nature of Injury	Occupation	Cause	Source
Post A	102	28	6	42	15
Post B	137	5	0	12	2
Post C	54	20	22	22	8
Post D	61	2	2	7	9
Post E	15	0	4	5	3

post with the responsibility of ensuring that all the blocks on accident forms are thoroughly completed prior to their data being entered into ASMIS.

The results of the computation of peer groups and MEDCOM accident rates, on its face, shows that employees in the smallest facilities experienced the highest total accident/illness rates per 100 work years when compared to any other groups of HCWs in the MEDCOM. However, this group

sustained the second lowest LT accident rate. The reasons for this phenomena may be that the occurrence of an accident among a small work force may be a major event and be better monitored and reported because of a decreased span of control of supervisors. The high NLT and low LT rates in Peer Group 6 employees could be associated directly to this group's low work load intensity and high degree of supervision. Intuitively, one would think that the larger facilities having the more complex, intense work load and an increased span of control for its supervisors would have the highest accident rates and conversely that the smaller MTFs would have the lower rates. However, this explanation does not hold true with respect to Peer Group 5. Peer Group 5's rates were clearly the lowest of all groups in the MEDCOM, even though it is larger than Peer Group 6 but smaller in size to the other four peer groups.

Further investigation of Peer Group 5's facilities operations may provide the reasons why this group experiences lower accident rates. The lessons learned could be shared throughout the MEDCOM. The entire process of how MTFs are grouped may render different rates in future studies.

The MEDCOM overall accident rates of 2.41 for NLT, 5.22 for LT, and 7.63 total accidents per 100 work years does provide an overall bench mark for the entire population of civilian employees. The MEDCOM rates are lower than in two

studies cited in the literature review. Wilkinson, in a similar study of a Northwestern state university health system, recorded a rate of 8.71 incidents per 100 work years (Wilkinson et al. 1992). Neuberger, Kammerdiener, and Wood in their study at Kansas University Medical Center, found a 19.29 rate. The MEDCOM rates are also generally better when compared to the latest U.S. Department of Labor statistics, for the national health care service industry for 1993. These rates were: 5.7 incidents per 100 work years for no lost time cases; 3.9 incidents for lost time cases; totalling 9.6 incidents per 100 work years for the entire U.S. civilian health care sector (U.S. Department of Labor, 1995).

However, upon closer examination, it can be seen that the MEDCOM's LT rate, which represents the most expensive component of this bench mark, is 1.32 higher than the national rate. Additionally, the MEDCOM rate does not represent the attack rates of occupational injuries/illnesses on its entire work force. It does not include accidents sustained by active duty personnel employed in the MEDCOM. Since, this project's area of focus was only on the civilian component of the work force, a future study that includes active duty personnel and all MEDCOM employees may provide a more meaningful and comprehensive picture of the occupational health of the command.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

It is felt that this graduate management project's results will act as a pertinent resource to all MEDCOM MTF administrators facing the new challenge of being held directly accountable for the control and payment of their own civilian employees' FECA claims. All information presented in this project utilized the actual FY 94 FECA claims data that will act as the basis for the establishment of MTF FECA budgets, which is one of the cornerstones of control of this new program to begin in FY 96. However, because of the limitations discussed, conclusions from this must be interpreted cautiously.

The research results did confirm that there are numerous functional relationships between all natures of injuries and assorted employee demographic, organizational, and job site factors and events. Use of stepwise regression analysis has identified thirty-three total predictors for the five natures of injuries studied. Of these, ten factors were found to be statistically significant predictors of the nature of injury back strain.

Predictors identified for the other natures of injury included multiple strains (6), puncture (3), contusions (8), and diseases (6). The descriptive and inferential statistical analyses presented in this study could be replicated at the MTF or Health Service Support Activity level. They could be used to assist in specific efforts to identify local risk factors and in the implementation of regional risk assessment and possible accident prevention programs.

This project confirmed that the nature of injury is predictive of the medical and compensation claims paid. Back strain was clearly the most frequent and expensive type of injury in the MEDCOM in terms of FECA medical and compensation claims, and payment of CoP benefits. The computation of CoP should act as a beacon to alert MEDCOM administrators that occupational injuries not only incur the reported FECA claims costs but also carry the burden of millions of dollars of "hidden" CoP benefits being wasted. It is imperative that the MEDCOM pinpoint ways to reduce back strains and all types of injuries to lessen their negative effects on overall productivity, employee morale, and service to its beneficiaries.

With the information presented on accident rates, MTF leadership can bench mark their own facility's efforts in preventing and reducing the occurrence and payment of claims. Knowledge and information is a powerful weapon to

be used by all parties concerned. This researcher believes that the regular publication and dissemination of meaningful peer group accident rates to MTF leadership, occupational safety staffs and employees can unite efforts in reducing these hazards.

The MEDCOM must explore ways to foster a positive corporate culture and concern for employee well-being. As cited in the literature review, the MEDCOM should explore programs to improve employee communication, assistance, and health and wellness. Organizational profit sharing programs that reward employees or departments achieving success in reducing accidents should be considered. Civilian corporations implementing similar programs have experienced significantly fewer accidents.

Employees, supervisors, and CPO and Safety Office personnel at the MTF and post levels need to be more reliable in the provision and collection of complete information on injuries, illnesses, and work area hazards. Accident investigation forms must be completed accurately to enhance the investigation of claims and to provide valuable data for future studies.

With continued refinement of this type of project's research design, high risk groups of MEDCOM HCWs could be more accurately identified and then studied to search for risk factors in the workers themselves, especially those most amenable to intervention that may predict which workers

may be predisposed to occupational injury. The literature states that case control studies of occupational injuries are useful in comparing characteristics of HCWs receiving a particular injury with a comparable group who did not experience the same type of injury (Wilkinson 1987). Back injuries sustained by direct care and wage grade personnel seems a particularly important area for this type of research in the MEDCOM.

It is this researcher's opinion that an environment needs to be created to foster increased opportunities to learn from and cooperate with the other military services and the Department of Veterans Affairs in developing strategies in preventing and reducing occupational injuries, illnesses, and hazards. Collaboration in such efforts could reduce costs of research and increase understanding as the Services move into the TRICARE environment and continue to share more resources. Much could be learned from the Veterans Health Administration. It has been operating a FECA chargeback system for its 171 health care facilities and 220,000 civilian health employees since FY 94 (Department of Veterans Affairs 1994).

Mechanisms need to be created to capture lost days per claims in order to supplement information on work-related injuries and amplify the differences between medical costs and compensation costs in FECA claims. Time on the job and years of experience need to be identified on injury claims

for the purpose of determining the training and retraining cycles of employees who potentially fall victim to job complacency.

The clinical implications of this study indicate that an increase in the timely supervisory training of employees on job safety and work-related hazards be tied into the implementation of job safety programs. Together, these adjustments should significantly increase administrator's ability to control accidents, the costs of worker's compensation claims, and avoid the use of O&M funds which negatively impact the mission of the MEDCOM.

Appendix 1

DEPENDENT(X) AND INDEPENDENT(Y) VARIABLES

Categories of independent variables for hypothesis one are:

X-1: Gender (2 categories-mutually exclusive categorically exhaustive [MECE] coded data)
Sex of the civilian employee having the accident/filing a claim

Male
Female

X-2: Age (5 categories-MECE)
Age in years of the civilian employee having the accident/filing a claim

20-29 years
30-39 years
40-49 years
50-59 years
60 years and older

X-3: Occupation (6 categories-MECE)
Coded by job series of the employee having accident or filing a claim, based on job descriptions provided in the Code Structure Index (TS-128) and the Code Structure Index to Definitions of Trades and Labor Job Families and Occupations (TS-68 June 1993). U.S. Offices of Personnel Management:

Direct Care - Front line contact with patients; e.g., physicians, registered nurses, licensed practical nurses, and nurses aides.

Ancillary Support - Direct support of patient care and direct care workers; e.g., pharmacists, laboratory, radiology, physical therapists, occupational therapists, and nutrition care.

Administrative Support - Provides clerical or indirect support to overall operations; e.g., clerks, secretaries, supervisory personnel, receptionists, finance, and personnel specialists.

Facility Support - Provides environment and safety support, supply and services, medical materials, surgical supplies, plant operations, and security.

Appendix 1.--Continued:

Wage Grade - Classified as being paid hourly. May work throughout the entire organization; e.g., warehouse, housekeeping, journeymen.

Unspecified - Employee job series unknown.

X-4: Peer Group (6 categories-MECE)
The relative size in relation to productivity and workload of the civilian employee's parent MTF as defined by U.S. Army PASBA. MTFs listed include all of the civilian employees located in their outlying clinics.

Group 1
Brooke AMC, HQ/MEDCOM/AMEDD C&S, Ft Sam Houston, TX
Walter Reed AMC, Washington DC
Fitzsimmons AMC, Denver CO

Group 2
Eisenhower AMC, Ft Gordon, GA
William Beaumont AMC, Ft. Bliss, TX
Madigan AMC, Ft. Lewis, WA
Tripler AMC, Honolulu, HI
2d General Hospital, Lunstul, Germany

Group 3
Moncrief ACH, Ft. Jackson, SC
Womack AMC, Ft. Bragg, NC
Martin ACH, Ft. Benning, GA
General Leonard Wood ACH, Ft. Leonard Wood, MO
Darnell ACH, Ft. Hood, TX
Reynolds ACH, Ft. Sill, OK
Ireland ACH, Ft. Knox, KY
Blanchfield ACH, Ft. Campbell, KY
95th CSH, Heidelberg, Germany

Group 4
Gorgas ACH, Panama
Evans ACH, Ft. Carson, CO
Irwin ACH, Ft. Riley, KS
Baynes-Jones ACH, Ft. Polk, LA
Dewitt ACH, Ft. Belvoir, VA
Winn ACH, Ft. Stewart, GA

Group 5
Cutler ACH, Ft. Devens, MA
Kimbrough ACH, Ft. Meade, MD
McDonald ACH, Ft. Eustis, VA
Fox ACH, Redstone Arsenal, AL
Patterson ACH, Ft. Monmouth, NJ
Kenner ACH, Ft. Lee, VA

Appendix 1.--Continued

Munson ACH, Ft. Leavenworth, KS
Keller ACH, West Point, NY
67th CSH, Wurzberg, Germany

Group 6
Noble ACH, Ft. McClellan, AL
Bliss ACH, Ft. Huachuca, AZ
Lyster ACH, Ft. Rucker, AL
Bassett ACH, Ft. Wainwright, AK
Weed ACH, Ft. Irwin, CA
Wilcox ACH, Ft. Drum, NY
Appendix 1: Dependent and Independent Variables Continued

X-5: Month (12 categories - MECE)
Month of the year 1994 that the civilian employee had the accident/filed a claim

January - 1 to 31 January
February - 1 to 28 February
March - 1 to 31 March
April - 1 to 30 April
May - 1 to 31 May
June - 1 to 30 June
July - 1 to 31 July
August - 1 to 31 August
September - 1 to 30 September
October - 1 to 31 October
November - 1 to 30 November
December - 1 to 31 December

X-6: Day (7 categories - MECE)
Day of the week in which the civilian employee had the accident

Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday

X-7: Cause (6 categories - MECE)
Things, circumstances, or actions causing the civilian employee's accident or the filing of a claim.

Vehicle/machinery
Explosion, electrical, chemical fire
Handling materials,patients
Falling objects, physical contact

Appendix 1.--Continued

Falls, slips, trips
Unspecified cause

X-8: Source (5 categories - MECE)
Things, areas acting as the starting point of the injury:

Working Area
Environmental condition, hazardous material
Work equipment, vehicles, tools
Inanimate, animate objects
Unspecified Source

Below are the categories of dependent variables for hypothesis one and independent variable categories for hypothesis two:

(Y for Hypothesis One) (X for Hypothesis Two):
Nature of Injury (5 categories - MECE)
Final classification of injury after diagnosis:

Y-1: Back strain: traumatic or disabling injury sustained chiefly to the back

Y-2: Multiple strains: traumatic or disabling injury sustained to other muscles, ligaments, tendons other than those in the back

Y-3: Puncture: traumatic penetrating injury through the skin, to include cuts, lacerations and needlesticks

Y-4: Contusions: traumatic injury chiefly to the skin to include bruises, abrasions, burns, scalding, and fractures

Y-5: Disease: traumatic or disabling diseases; either infectious or congenital that are work-related; will include heart conditions, mental disorders, stress, respiratory problems, and infectious diseases such as tuberculosis and hepatitis.

Dependent variable for the hypothesis two is:

(Y for Hypothesis Two): Claims Cost (continuous ratio coded data)
Amount of FECA claims paid for a work related accident or disease sustained by a civilian employee. May contain medical or compensation claims costs paid under the FECA.

Appendix 2

COMPUTATION OF CONTINUATION OF PAY OF LOST TIME INJURIES

Data from the Army Surgeon General's Manpower Office and the U.S. Army Medical Command's Program and Budget Office to include employee full time equivalency rates (FTE) and payroll figures will allow for a computation of continuation of pay expenditures for civilian employees sustaining work related lost time injuries. This data will provide MEDCOM administrators an average civilian employee annual salary that can be used in conjunction with accident frequency data in estimating their continuation of pay expenses. Below is the result of these computations:

FY 94 FTE Year End Strength for Civilian employees for the MEDCOM = 26,497

FY 94 FTE Total Expenditures for Civilian Payroll = $958,000,000

An average annual salary for an FTE can be computed by dividing the end strength into the year end civilian payroll. Average Annual Salary = $36,155

Worst case scenario assumes that a civilian employee has 45 calendar days of lost time or 30 work days when sustaining a traumatic injury/illness. That is equal to 3.2 pay periods.

The average MEDCOM civilian employee earns $1,391 each pay period. This figure was arrived at by dividing the annual average salary figure ($36,155) by 26 pay periods per year.

MEDCOM administrators have the potential of spending $4,451.00 of continuation of pay benefits for each lost time injury case. This figure was arrived at by multiplying the average pay per pay period salary figure of $1,391 by 3.2. This expense is in addition to medical and compensation benefits paid under the FECA. These expenses are paid from O&M funds.

In the 2,023 sample cases for this project 1,383 were lost time injuries. HSC had the potential of spending in FY 94, a total of $6,156,010 in continuation of pay. This figure was arrived at by multiplying the potential per case continuation of pay expense figure of $4,451 by the total HSC lost time cases of 1,383.

These expenses represent those that can be avoided and should inspire MEDCOM administrators to be more proactive in the prevention of accidents.

Appendix 3.--SAMPLE OF THE ASMIS REPORT

HSC CHARGEBACK COST FOR DOL FY 94 09:39 Thursday, February 16, 1995 11

------------------------------ CPO=FT MCCLELLAN ------------------------------

CASE	CASE DATE	POST	AGE	SEX	OCC	DOI	Z	DAY	EXT INJ	NAT	CAU	SRCE CODE	MED COST	COMP COST	TOT COST	FREQ
0078527	700731	AX	55	M	61	700508	5	FRI	X	TB	64		0.00	22959.86	22959.86	1
0057843	710101	AX	47	M	53	680314	4	THR	X	TB	92		100.00	20390.96	20490.96	1
0202079	781205	AX	46	M	99	780911	1	MON	X	TB	99		0.00	2512.00	2512.00	1
0409459	870205	AX	35	F	Z9999	870102	5	FRI	X	TI	23	0720	1257.00	0.00	1257.00	1
0421351	870826	AX	46	F	Z9999	870708	3	WED	X	TB	51		7811.81	16928.36	24740.17	1
0424481	871020	AX	63	F	Z9999	871002	5	FRI	1	TS	82		0.00	17427.89	17427.89	1
0499411	901015	AX	36	F	G0681	900907	5	FRI	X	T9	84	0140	141.00	0.00	141.00	1
0557130	921204	AX	39	F	G0679	921014	3	WED	X	T9	51	0140	582.00	0.00	582.00	1
0557738	921214	AX	51	F	Z9999	920810	1	MON	X	RB	11		0.00	1392.43	1392.43	1
0561574	930218	AX	59	M	Z9999	930119	2	TUE	1	DH	99		427.00	0.00	427.00	1
0564859	930326	AX	55	F	G0681	930211	4	THR	1	TC	64	0740	36.00	0.00	36.00	1
0569135	930520	AX	52	F	G0610	930324	3	WED	1	TB	51	0160	817.00	0.00	817.00	1
0571780	930629	AX	37	F	G0620	930515	6	SAT	X	TS	90	0140	34.00	0.00	34.00	1
0573041	930714	AX	45	M	G0610	930521	5	FRI	X	T9	90	0940	0.00	0.00	0.00	1
0573535	930721	AX	52	F	G0681	930618	5	FRI	X	TB	51	0820	0.00	0.00	0.00	1
0573981	930727	AX	54	F	G0645	930416	5	FRI	1	T9	51	9999	10112.93	11510.86	21623.79	1
0574237	930729	AX	30	F	G0647	930323	2	TUE	X	DS	51		1356.00	290.40	1646.40	1
0575658	930817	AX	31	F	G0679	930802	1	MON	X	D9	99	0280	0.00	0.00	0.00	1
0580106	931014	AX	58	M	W7404	930728	3	WED	X	TL	63	0830	0.00	0.00	0.00	1
0580757	931021	AX	42	F	G2005	930920	1	MON	X	TC	63	0830	0.00	0.00	0.00	1
0580804	931022	AX	46	F	G0610	930505	3	WED	1	DM	99	0280	0.00	0.00	0.00	1
0580988	931026	AX	40	F	G0679	930804	3	WED	1	TS	84	0140	5644.62	0.00	5644.62	1
0581983	931108	AX	35	F	Z9999	931013	3	WED	1	TI	99	9999	0.00	0.00	0.00	1
0582026	931108	AX	46	F	Z9999	930505	3	WED	1	DM	99	0280	0.00	0.00	0.00	1
0582315	931115	AX	35	F	G0679	930326	5	FRI	X	T9	51	0820	22.59	0.00	22.59	1
0585262	931221	AX	39	F	Z9999	931021	4	THR	1	DS	51	0800	0.00	0.00	0.00	1
0585731	931229	AX	50	M	W5703	931118	4	THR	X	T9	51	0810	1007.00	0.00	1007.00	1
0589641	940224	AX	57	F	G0602	931216	4	THR	X	TC	82	0110	0.00	0.00	0.00	1
0589687	940224	AX	38	F	Z9999	930614	1	MON	1	DS	51	9999	976.00	0.00	976.00	1
0594189	940420	AX	38	F	G0610	930830	1	MON	X	TC	84	0140	0.00	0.00	0.00	1
0594897	940502	AX	63	F	G0610	940411	1	MON	X	TB	99	9999	0.00	0.00	0.00	1
0595617	940510	AX	47	F	G0679	940419	2	TUE	X	TS	92	0110	95.00	0.00	95.00	1
0595618	940510	AX	46	M	G0610	940421	4	THR	1	TB	25	0810	0.00	0.00	0.00	1
0595619	940510	AX	32	F	G0318	940421	4	THR	1	T9	64	0110	263.46	0.00	263.46	1
0599403	940624	AX	43	F	Z9999	940518	3	WED	X	TB	69	0110	0.00	0.00	0.00	1
CPO													30683.41	93412.76	124096.17	35

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